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ABSTRACT

The comprehensive-versus-selective school issue is primarily a socio-politico-economic rather than pedagogic problem. The International Project for the Evaluation of Educational Achievement (IEA) had as its primary objective to relate certain social, economic and pedagogic characteristics of the different systems to the outcomes of instruction in terms of student achievement and attitudes. We limit ourselves here to problems related to the different systems and focus on the problem given in the slogan "Does more mean worse?" The IEA mathematics survey comprised of 12 countries and random samples of about 133,000 pupils from 5,450 schools. Four target populations at the 13 year and pre-university level were sampled and tested in all the countries. The Science survey comprised of 258,000 students from 9,700 schools in 19 countries. The students were sampled by random from four large populations. (1) Students aged 10:0-10:11, when they, in all countries, still were taught by one teacher in a self-contained classroom. (2) Students aged 14:0-14:11. (3) Students in the last grade of the compulsory school. (4) Students in the grade from which transfer to the university occurs. The mathematics investigations revealed a sharply fluctuating average level between countries among students in the senior, pre-university class. However, these comparisons of arithmetic means were not especially interesting unless allowance was also made for variations between countries in their recruitment bases or "retentivity." If that was done and equal proportions of cohorts were compared, the variations turned out to be considerably less on an average. (Author/JM)

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Implications of IEA Findings for the Philosophy of Comprehensive Education

by

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presented at

Conference on Educational Achievement
Harvard University, November 1973

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Implications of IEA findings for the philosophy of comprehensive education

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The main purpose of the following introductory observations is to contribute to a clarification of the comprehensive-versus-selective school issue. The main thesis is that we are here primarily not dealing with a pedagogic but a socio-politico-economic problem.

We lack an international terminology in education, at least one that lends itself to a description of educational structures. To an Englishman, "comprehensive school" means a school offering under one roof the major secondary school programs. To an American, it denotes a secondary high school catering to all children drawn from a certain district and providing all kinds of programs. To a Swede, it signifies the basic, organizationally undifferentiated nine-year school. It thus refers both to the elementary and secondary stage and is conceived by and large in the same way as was the *école unique* in France or *Einheitsschule* in Germany in the educational debate after World War I. During the last decade *Gesamtschule* in the latter country refers to an integrated school covering the entire compulsory school period. To be genuinely comprehensive the enrollment has to reflect in a representative way

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the social composition of the community outside the school, and its programs should vary enough to meet a broad range of student needs. Comprehensiveness is thus conceived of as integration with reference both to enrollment and curricular offerings.

All educational institutions are indeed more or less selective in terms of both access and screening procedures, such as grade-repeating and drop-out rate.[1] But the national systems vary tremendously in the severity with which they employ these selective practices. In some countries there are almost no enrollment restrictions during the age range covered by compulsory schooling. When it comes to the choice of optional programs, this is up to the pupil and his parents. For instance, the nine-year basic school in Sweden is by law prohibited from selecting students for the various options in grades 7 through 9, whereas at the age of 16, when transfer occurs to the upper secondary school, competitive selection to the various programs occurs on the basis of grades obtained in the terminal grade of the basic school. In most Western European countries, where until now transfer from the elementary to secondary school has taken place at the age of 10 to 12, competitive selection in terms of both scholastic ability and social background (which are intrinsicly correlated) has been rather severe. But there is a marked tendency to bring about greater flexibility and to postpone definitive selection by introducing a guidance period (cycle d'orientation). This was introduced by the famous de Gaulle decree in 1959.[2] The Strukturplan submitted by the Deutscher Bildungsrat in 1969

"orientation phase".[3]

Other types of selectivity also vary greatly. Grade-repeating during compulsory schooling, and particularly in the elementary school, is almost non-existent in some countries. Promotion from one grade to another takes place on the basis of chronological age. In other systems considerable grade-repeating already takes place in the first grade in the elementary school.[4]

The main forces behind the change from a selective-élitist to a more comprehensive school structure in many European countries can, it seems to me, be categorized under three main headings:

(1) An <u>increased standard of living</u> and improved public welfare has been conducive to heightened aspirations in terms of self-realization and an increased individual demand for education. This increase in educational consumption is sometimes referred to as "social demand" for education.[5] Sweden is a case in point. Paulston shows in his study of the Swedish School Reform that after basic reforms which aimed at establishing social welfare and full employment had been introduced and implemented, demands for a reform of the structure of the educational system that would increase participation and broaden access came to the forefront.[6]

(2) <u>Democratization</u>, particularly of secondary and higher education, with the aim of equalizing opportunities and opening up educational careers, especially for talented students from lower-class homes. "Equality of opportunity" (<u>Chancengleichheit</u>) has become one of the catch phrases behind

the attempts to reshape the structure of the educational system by removing geographic, economic and psychological barriers which hinder children from "under-privileged" homes to get access to high level education.[7] The demand for equality does, however, not imply identity in treatment. The Deutscher Bildungsrat in its recommendations emphasizes: "The task is rather to equalize the opportunity early and to differentiate the offerings of the educational system later in order to promote the abilities and interests of the young people and to see to it that further education gives the corresponding offering".[8]

The liberal conception of "equality of opportunity" has been that geographic and economic barriers should be reduced or entirely removed in order to give all children, irrespective of social background, the same chance to compete in climbing the educational (and social) ladder. As I have pointed out in another connection,[9] those in the Swedish labor party who were framing the party's school policy during the 1920's and 1930's were even ready to tacitly accept an élitist educational system, provided support in terms of stipends or removal of tuition fees could be given to lower class students.

Under the impact of research conducted by educational sociologists and developmental psychologists, the concept of "equality of opportunity" has recently had to be thoroughly revised.[10] Previously, equality was felt to have its starting point with the inherited, once and for all given, ability to absorb school learning. The students had varying "natural

capacities" which from birth had been bestowed upon them. Therefore, educational policy should aim at giving everybody an education that brought him to the limit of his capacities. Society had only to see to it that material circumstances did not prevent the individual from utilizing his God-given, unchangeable talent by obtaining a suitable, career-promoting education. Once he had been admitted to a suitable school or program, the blame for failing it lay primarily with him and not with the system. During the last decade we have become aware of the tremendous, but subtle, influence exerted by the home environment in providing the child with learning tools, increasing his vocabulary, interacting with him in order to train him to carry out tasks by himself, and influencing his attitudes and motivation. "Ability to learn" is to a large extent acquired at home during pre-school age. The reason why lower class children fail at school to such a great extent in comparison with middle or upper class children is chiefly their relative lack of certain skills which are basic prerequisites for success in school learning. In France, for instance, grade-repeating at the beginning of elementary school is much more frequent during the early stage of the <u>école primaire</u> among children with working class background than among the rest.[11])

Thus, the task of the school and of society at large could not be confined to providing a merely formal equality in material terms, by, for instance, giving everybody free access to the same basic education provided in schools with uniform resources and standards. It is also up to these agents to

provide every child with the ability he requires in order to profit in an optimal way from the education offered to him by the system. This means that the school has to provide compensatory education for those with environmental handicaps. This applies particularly to institutions catering for children of pre-school age. Intellectual differentiation as measured by traditional so-called intelligence tests (and expressed by IQ's) chiefly takes place before children enter elementary school.[12)]

Educational sociologists have made us aware of the fact that selective measures of all kinds, such as grade-repeating and drop-outs, are related to social background.[13)] According to the traditional philosophy of "equality of opportunity" everyone should have the same chance to compete on the basis of his "native capacity". One's socio-economic handicaps have to be compensated for by material support in terms of free places or stipends. But what is meant by "ability"? The criteria used in selecting students could be placed in one of three categories: test scores (on intelligence and/or achievement tests), school marks, and examinations (entrance or final examinations). All these criteria are to a varying degree correlated with social background variables, such as parental education and socio-economic status indices. Thus, selection <u>as such</u> means that there is a tendency, sometimes weak but sometimes quite strong, to give precedence to pupils with more privileged home background. Floud and co-workers evaluated the effect of "democratization" of grammar school

selection at eleven-plus in England, as supposedly achieved by the 1944 Education Act.[14] They found that when all grammar school places were thrown open to those who did well on the eleven-plus examination the proportion of working class children decreased, whereas the proportion of middle class children increased. Previously, when fees had to be paid, a given number of free places were kept open for children from lower class homes.

The earlier the stage when selection takes place, the more strongly the social factors operate. The child of 10 to 12 could not reasonably be expected to be actively and rationally involved in his future educational and occupational career decisions to the same extent as a youngster of 15 or 16. Therefore, as was shown in the mathematics survey by the International Association for the Evaluation of Educational Achievement (IEA), in systems where selection for academic secondary education takes place at an early age the social class structure of the enrollment differs much more markedly from the social composition of the general population than in countries where transfer takes place late or where the system throughout the entire mandatory school age is comprehensive, that is, provides all children in a certain area all kinds of education under the same roof.[15]

(3) Mass education at the upper secondary and at the tertiary level, referred to as the educational explosion, has to be regarded as a reflection of both the rapidly growing need for trained manpower and an increasing "educational consumption". These forces, however, conflict with a school

is rather static and a society with a rigid and élitist social structure. The problem could briefly be described as follows:

Until recently both the occupational status structure and the social system in many European countries could be symbolized with a pyramid.[16] At the bottom of the pyramid there is a majority consisting of unskilled or semi-skilled manual workers. Most of them have a very modest formal education given by a compulsory, elementary school, which until recently has varied in length from six to eight or nine years. The next level mainly consists of white collar workers, such as clerical and sales workers, supervisors in industry, and nurses. The formal education required in most cases exceeds elementary school by a few years and was usually some kind of "middle school" with graduation at 15 or 16, which did not qualify for university entrance. The middle schools were either separate establishments or consisted of the lower section of the pre-university, academic secondary school. At the top of the pyramid we find a small percentage of the age group which has graduated from the academic pre-university school and the university. Persons with these qualifications make up the professional occupations.

In contrast, the status structure of the occupational universe in economically highly developed countries, which are on their way into the post-industrial society, increasingly takes the shape of an egg. At the bottom of the status hierarchy there is a diminishing number of occupations that require a modest formal schooling and vocational training

over a considerable time. In the middle there is an increasing number of occupations requiring formal education extended to the age of 16-18 and a specialized vocational training. At the top the number of persons with higher education and professional occupations rapidly increases.

It has in countries, such as the Federal Republic of Germany and England, repeatedly been emphasized that a reorganization of school structure ought to be based on adequate empirical research. Adherents of an élitist system and those who favor an unselective school all endorse the statement that before policymakers decide to "go comprehensive" they should have evidence showing to what extent this means an improvement or impairment. However, a problem which is seldom explicitly raised is that different opinions exist regarding the criteria to be chosen as indicators of adequacy or efficiency of the systems. Those who are in favor of a parallel, bipartite system tend to measure the quality of the end-products of the system, i.e., those who survive it until graduation or certification, whereas those in favor of a unified, comprehensive system tend to consider the quality of education given to all students who enter the system. Evidently, the end-product criterion tends to favor an élitist system, whereas the all-student criterion is compatible with a comprehensive philosophy. But even if agreement on employing only one of these two main criteria could be reached, there would still be difficulties in reaching a consensus about the specific criteria to be employed in assessing the attainments of the individual students. What emphasis should be put on learning hard facts

as compared to skills? How should absorbed knowledge be weighed in comparison with the ability to learn new things? How important should be non-cognitive objectives, such as independence, ability to cooperate or to take responsibility? Those who prefer a bipartite system tend to value skills and affective objectives less highly than do those who favor a comprehensive system.

Thus, the comprehensive-versus-selective school issue provides another illustration of a problem pointed out by Gunnar Myrdal back around 1930 and recently taken up by him again: the place of implicit values in the social sciences.[17] It would take us too far to spell out the problem here. Suffice it to say that the social researcher is guided by his own value preferences not only in choosing the problems he sets out to investigate, but also in selecting the variables which seem to him to be relevant, and - last but not least - in interpreting his findings. This, however, does not mean that researchers are bound to be dependent upon their different value premises to the extent that they would operate in perfect solipsistic isolation from each other. Such a view would in this particular case imply that the researcher with a selective bias would consistently end up with facts favoring an élitist system, whereas the comprehensively biassed researcher would only produce evidence supporting a comprehensive system. Consensus can be reached by defining carefully certain circumscribed problems which lend themselves to investigations which can be interpreted uniformly and independently of the

dardized examinations, in which of the two systems do the students on the average score higher? Is it possible in a comprehensive system to bring the élite, say the top ten per cent students within an age cohort to the same level of competence as in a selective system?

The standard of the élite in selective and comprehensive educational systems - findings from the IEA surveys.

Educational folklore has always been full of sweeping statements about the relative quality of education in various countries. Under the impact of the Sputnik psychosis in the United States at the end of the 1950's eminent personages, such as H. Rickover, began to add to this folklore by making sweeping statements about the relative merits of American and European education. Typical of the spell of the, one is tempted to say, masochistic self-criticism that was levelled at American education was the eagerness to look for remedies in Europe that would enable the United States to revise particularly its secondary education and thus compete successfully with the Soviet Union and other countries, particularly in producing qualified scientists and engineers.

Most of the naive comparisons between national school systems that were made under the impact of the Sputnik shock were based upon assumptions which have until recently never been empirically tested. So far, criteria of the "outcomes" of national educational systems have often been enrolment or

graduation figures, but no international criteria for educational quality, such as internationally valid attainment tests, have been devised.[18] Within countries there is a rather high degree of uniformity in educational structure and practices, whereas across countries there are considerable differences. By relating input factors, such as the social background of students, teacher competence, curriculum characteristics and teaching practices, to outcomes in terms of achievement and in terms of attitudes toward school learning, cross-national comparisons could be made on a much firmer basis. We would then be able to identify factors which are decisive in influencing student achievement. In order to carry out meaningful comparisons between countries and to identify such factors, we need to establish internationally valid yardsticks by means of which the standards of pupils at certain grade or age levels or at certain terminal points (for instance at the end of the pre-university school) can be assessed.[19]

The term "standard" has a time-honoured place in educational folklore; it often has connotations of self-evidence conducive to the belief that it is metaphysically anchored. The accusation of "lowering standards" is frequently levelled in order to counter attempts to change educational structure in order to broaden opportunities. It is a phrase which has an almost deadening effect upon those who advocate changes. When the élitist type of secondary academic schools in Sweden was gradually replaced during the 1950's and 1960's by comprehensive schools providing universal secondary education, a common objection was that the new system would "lower the

standards". The new schools had to disprove the contention that "more means worse" by being subjected to continuous comparisons with the selective secondary schools. For almost a decade, it did not occur to anyone in Sweden that one cannot compare a comprehensive with a selective educational system solely in terms of their respective end-products. In the first place, one has to evaluate the systems in terms of the price paid for the quality of the end-products. What is the attrition rate?[20] In the second place, we must consider the "productivity" of an educational system, by asking: How many are brought how far? We shall here focus on a third type of problem where a fair comparison can be made: Does more mean worse? or: Is the standard of the élite lower in a comprehensive than in a selective system?

The International Project for the Evaluation of Educational Achievement (IEA) was <u>not</u> launched primarily to compare countries. The cooperating research centers did by no means intend to conduct a kind of "cognitive olympics". The overall aim was to relate certain social, economic and pedagogic characteristics of the different systems to the outcomes of instruction in terms of student achievement and attitudes. We shall limit ourselves here to problems related to the different <u>systems</u> and focus on the problem given in the slogan: "Does more mean worse?" It should, however, be pointed out that the IEA project was designed to study the relationships between education and the salient social and economic factors within countries. An educational system does not operate in a

socio-economic vacuum. The change in school structure from a dual, class-stratified to a more integrated and unitary one, which we are witnessing in several European countries, reflects a trend toward a society and an economy with a rapidly increasing need for highly trained manpower. Such a need cannot be satisfied by an élitist system based on social and intellectual selectivity.

The IEA mathematics survey comprized twelve countries and random samples of about 133,000 pupils from 5,450 schools.[21] Four target populations at the 13 year and pre-university level were sampled and tested in all the countries, consisting of: (1) All the pupils who were 13:0 - 13:11 on the day of testing; (2) All the pupils at the grade level where the majority of pupils of age 13:0 - 13:11 were to be found; (3) All pre-university pupils studying mathematics as an integral part of their course for future training or as part of their pre-university studies; and (4) All the pre-university pupils studying mathematics as a complementary part of their studies, and the remainder who did not take mathematics at all.

The Science survey comprized 258,000 students from 9,700 schools in nineteen countries. Most countries collected data on Reading Comprehension and Literature from the same students. The students were sampled by random from four large populations. (1) Students aged 10:0 - 10:11, when they still in all countries were taught by one teacher in a self-contained classroom. (2) Students aged 14:0 - 14:11. (3) Students in the last grade of the compulsory school. (4) Students in the grade from which transfer to the university occurs.

The rationale behind choosing these populations was, briefly, the following. If one wants to analyse the relationship between such factors as age of school entry, parental education and occupational status, teacher competence, amount of homework, number of hours of instruction, on the one hand, and the outcomes of instruction, on the other, there are evident reasons for choosing an age when all are still at school to insure a representative sample of the total age group. The age of 13 in 1964 proved to be best for this purpose. In 1970 we found that practically all children at the age of 14 were in full-time schooling in the industrialized countries. In some countries, the grade with the majority of 13 year olds consisted of those left in elementary school after the academic secondary school had taken off the "cream". In other countries, practically all the 13 year olds were found in the same grade. The pre-university group lends itself primarily to studies of "retentivity" and factors associated with selectivity. Together with an intermediate group of 15 to 16 year olds tested in a few countries, the pre-university group constitutes the basis for an analysis of the "total yield" of the educational systems under study.

At the end of the 1950's I attended an interesting conference sponsored by the College Entrance Examination Board.[22] The theme was "talent hunting", a most fitting one during the period of intensive soul-searching that occupied the Americans after the Sputnik shock. A European scholar in comparative education gave a lecture on "talent hunting abroad" in which he very competently described the high standards reached by upper secondary school leavers in most European countries and

thereby emphasized the high level of intellectual excellence on which undergraduate university education could be built. In the discussion afterwards, I took the liberty of pointing out that what had been so accurately and competently described was the high standard reached by the intellectual - and social - élite which survived the various screening procedures in the secondary academic school in Europe. These students consisted at that time of 5-10 per cent of an age cohort as compared to over 60 per cent in the United States. In order to make a fair comparison, therefore, one should take the top 15 per cent of high school graduates in the United States and compare them with the entire "high school graduating group" in European countries.

The first column in Table 1 gives the "retentivity" figures for 1964, when the data for the IEA mathematics survey were collected.[23] About 70 per cent of an age cohort in the United States and more than 50 per cent in Japan are in the final year of the secondary school, as compared to less than 20 per cent in most of the European countries which participated in the IEA mathematics study.

But not even a comparison which takes into account the differences between countries with regard to the proportion of the total age group reaching the pre-university level would be "fair". One should also take into account the price paid for the high standard achieved by the few. In that price, one should include the able pupils from underprivileged homes who were not given the chance to realise their potentialities because of the selective structure of the school system. In several European countries, children at the age of 10-12 are

still divided into two categories, whereby the "academic goats" are separated from the "non-academic sheep". One thus gets a dual-track system which reflects the traditional class stratification of the society. Students at the age of 10-12 do not have any articulate plans about their educational and vocational career. The decisions are made by their parents in terms of social ambitions and economic resources. Furthermore, the attrition rate, in terms of drop-out and grade repeating, is often very high in the traditional European academic secondary school. To take only one example: of 100 pupils who entered the German nine-year Gymnasium at the age of 10-11 less than 20 succeed in finishing the course in due time, at the age of 19.[24] The rest consists either of grade repeaters or drop-outs. The relationship established in the IEA mathematics study between selectivity (or its reverse, "retentivity") on the one hand and social background of the pre-university students, on the other, is given in columns 2-5 in Table 1. An index of 100 means that a group is fairly represented, whereas more than 100 means over-representation and less than 100 under-representation. As can be seen from Table 1, the higher the retentivity the lower the social bias. In for instance the Federal Republic of Germany, which both in 1964 and in 1970 had a rather low retentivity, students whose parents are professionals and executives are vastly over-represented, whereas working class students are strongly under-represented.

TABLE 1

Relationship between Retentivity and Social Class Composition of enrollment *at the Pre-university Level*

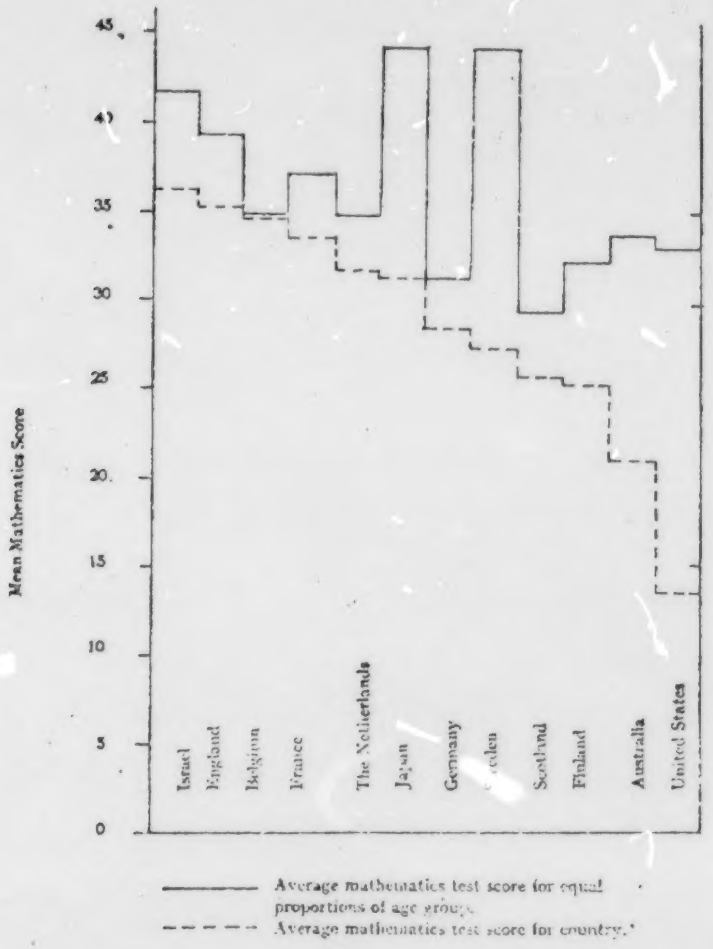
Country	Retentivity indices				
	(1) Percent of total age cohort in pre-university year	(2) Professionals, high technical executives (groups 1 and 2)	(3) Middle class sub-professionals, clerks, working proprietors etc. (groups 3, 4, and 6)	(4) Farm proprietors and farm laborers (groups 5 and 8)	(5) Working class skilled, semi-skilled and unskilled (groups 7 and 9)
USA	70	117	120	129	85
Japan	57	204	114	79	48
Sweden	23	344	169	30	48
Scotland	18	364	200	100	48
Finland	14	272	117	94	58
Belgium	13	263	126	110	51
England	12	620	184	75	31
France	11	538	161	119	..
Fed. Rep. of Germany	11	589	113	45	12

Source: T. Husén (Ed.): International Study of Achievement in Mathematics: A Comparison Between Twelve Countries. New York: Wiley, 1967.

Let us now look at the mean achievement at the pre-university level and begin our comparisons with those who study mathematics as a main subject. As can be seen from the dotted line in Figure 1, the average mathematics score among United States high school graduates taking mathematics is far below that of all other countries. However, we then

Figure 1

Mean Mathematics Test Scores
(1) for the Total Sample and (2) for Equal Proportions of Age Group in Each Country for Terminal Mathematics Populations

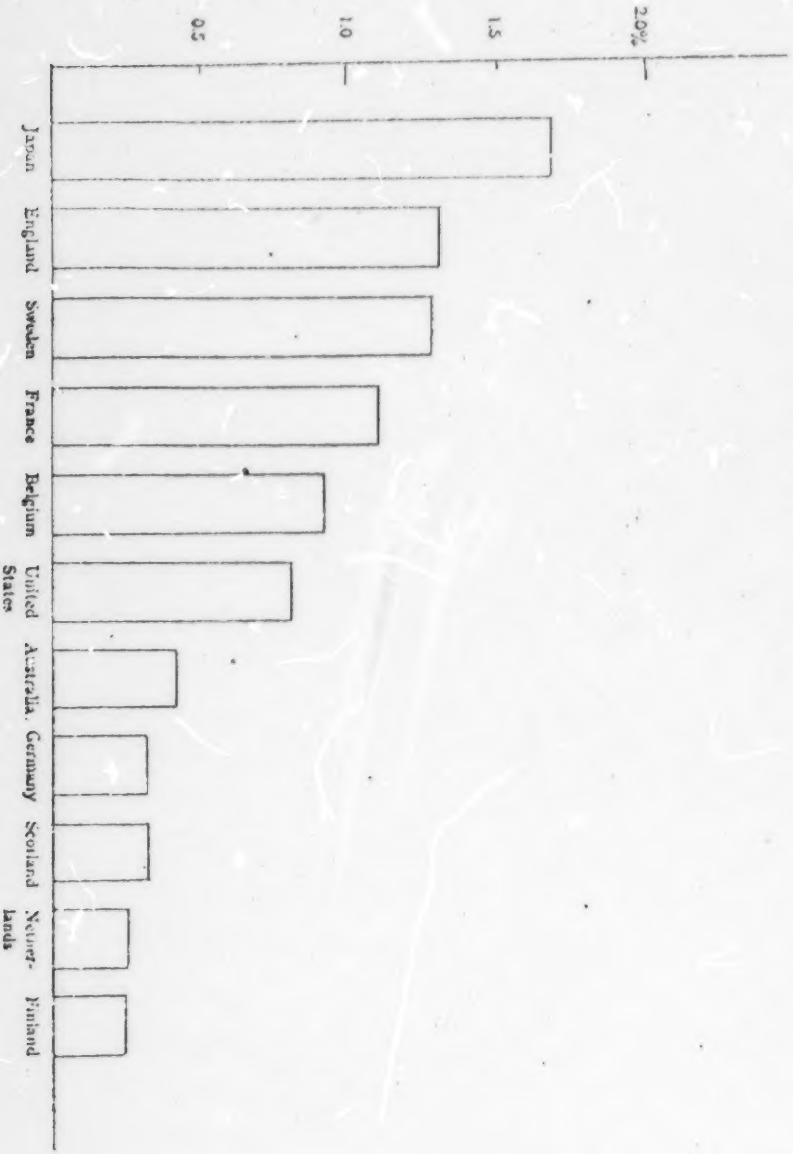


Source: T. Husén (Ed.): International Study of Achievement in Mathematics: A Comparison Between Twelve Countries. New York: Wiley, 1967.

take into account that in the United States about 18 per cent of the age group of 17-18 year olds took mathematics and science in the graduating class as compared to only 4-5 per cent of the age group in England or the Federal Republic of Germany. Considering this fact the problem could more fruitfully be restated: To what extent has it been possible within a comprehensive system like the American to produce an élite comparable in size and quality to the one produced within a European selective system? One way of answering this question is to compare equal proportions of the age groups in the respective countries. The dotted line in Figure 1 gives the average performance of all terminal mathematics pupils in the twelve countries. But when we compare the average score of the top four per cent of the corresponding age group, a proportion selected because it represents the lowest relative number of students in any country taking mathematics, namely Belgium, we obtain the results represented by the solid line. The range between countries is then much narrower than for the entire group of terminal mathematicians. The United States' top four per cent score about the same as most comparable European groups. Two countries with a comprehensive system up to the age of 15 or 16, namely Japan and Sweden, score the highest of all. On the basis of the distribution of scores among all the terminal mathematics students in all the countries international standards, in terms of percentile scores, can be obtained. In Figure 2 we have given the per cent of the total age group within each country which

Figure 2

Percent of Age Group Reaching Upper Tenth of Terminal Mathematics Pupils by International Standards



Source: T. Husén (Ed.): International Study of Achievement in Mathematics: A Comparison Between Twelve Countries. New York: Wiley, 1967.

has reached the standard achieved by the upper tenth of all the terminal mathematics pupils. As can be seen, none of the comprehensive and/or highly "retentive" systems are among the five countries at the bottom, whereas two, Japan and Sweden, together with England, are found at the top.

Thus, the mathematics investigations revealed a sharply fluctuating average level between countries among students in the senior, pre-university class. However, these comparisons of arithmetic means were not especially interesting unless allowance was also made for variations between countries in their recruitment bases or "retentivity". If that was done and equal proportions of cohorts were compared, the variations turned out to be considerably less on an average. The élites in most countries proved to lie by and large on the same level. So the question to ask now is: Does the same relationship govern in Science?[25] We first decided to compare the best 9 per cent of the tested population within the industrial countries. This percentage was chosen because it was the lowest proportion of the age cohort in any of the countries representing graduates from the upper secondary school.

To arrive at measures of two smaller élite groups we also chose 5 per cent and 1 per cent, respectively. In Table 2 the means for the graduates in participating industrial countries are indicated for the whole sample, for the best 9 per cent, for the best 5 per cent, and lastly for the best 1 per cent of the corresponding age cohort. Sizes of the graduate population are stated in the same way.

Table 2

Means and standard deviations of scores on the test in Science for all the graduates from the upper-secondary (pre-university) school and for the best 9 %, 5 % and 1 % of the entire corresponding age cohort

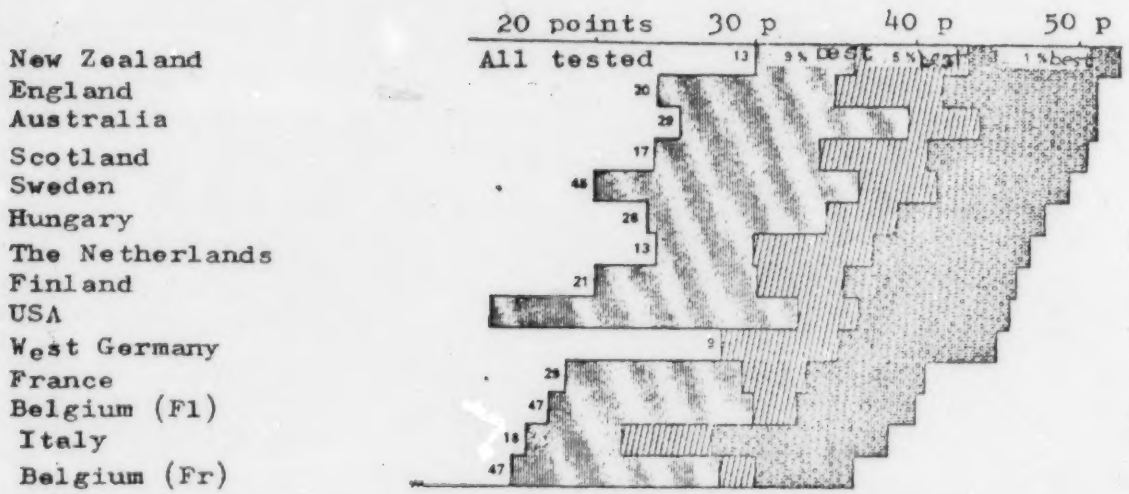
Country	% at School[a]	N	Full Sample Mean	Full Sample SD	Top 1 % Mean	Top 1 % SD	Top 5 % Mean	Top 5 % SD	Top 9 % Mean	Top 9 % SD
New Zealand	13	1 676	30.8	12.6	52.8	2.8	43.5	5.9	36.8	9.0
England	20	2 181	24 4	12.4	51.6	3.2	41.6	6.5	35.5	8.5
Australia	29	4 194	26.1	11.5	51.5	3.2	44.0	4.7	39.9	5.9
Scotland	17	1 321	24.4	12.9	50.7	3.8	40.6	6.4	34.4	8.7
Sweden	45	2 754	20.1	10.9	49.5	3.4	41.2	5.3	37.0	6.2
Hungary	28	2 828	24.0	9.6	48.0	3.8	39.0	5.4	35.0	6.1
Netherlands	13	1 138	24.4	12.0	47.1	3.6	37.2	6.5	30.3	9.4
Finland	21	1 725	20.8	10.5	46.0	4.1	35.7	6.4	30.7	7.4
USA	75	2 514	14.2	9.9	45.8	2.8	36.8	5.5	33.1	5.9
FRG	9	1 989	28.4	9.6	45.0	4.1	35.3	6.2	28.4	9.6
France	29	3 523	19.1	9.1	40.5	3.5	33.3	4.4	29.9	5.1
Belgium (Fl)	47	467	18.1	8.5	39.8	3.7	33.0	4.0	30.5	4.2
Italy	16	15 719	16.5	9.2	38.2	4.7	27.4	6.5	22.7	7.3
Belgium (Fr)	47	941	16.0	8.3	36.2	2.0	30.9	3.1	28.4	3.7

[a] Proportion of the whole age group which goes to school.

Source: L.C. Comber & J.P. Keeves: Science Education in Nineteen Countries. Stockholm & New York: Almqvist & Wiksell/Halstead Press (Wiley), 1973.

Figure 3

Means for all tested students and for the 9 %, 5 % and 1 % best students.



Source: L.C. Comber & J.P. Keeves: Science Education in Nineteen Countries. Stockholm & New York: Almqvist & Wiksell/ Halstead Press (Wiley), 1973.

As will be seen from Table 2 and Figure 3, the mean ranges from 30.8 for New Zealand to only 14.2 for the United States. The former country has a recruitment base or retentivity of 13 and the latter of 75 per cent. Sweden, with a retentivity of 45 per cent, scores 20.1 points in the all-testees column. Hungary, with a 28 per cent retentivity, scores 24.0 points; Australia, with a 29 per cent recruitment base, scores 26.1 points. If we then compare the means for the best 9 per cent of the age group, we find that countries with a broad recruitment base get sharply increased means. Australia lands in first place, Sweden in second. The U.S. score doubles and winds up higher than for, say, West Germany and France. If we next examine the means for the 5 per cent best students, we find that countries with a broad recruitment base move ahead even more. The highest means for the best percentages originate in four English-speaking countries with fairly similar educational systems, namely New Zealand, England, Australia and Scotland. Next comes Sweden, somewhat ahead of other European countries.

"How many are carried how far?"

Another method of evaluating a national system of education is to establish certain international standards. This gives more faceted information than means about how far the system carries the great mass of young people forward to certain levels of competence. The analyses set out below build upon the mean total score

Table 3

Proportion of students in the pre-university grade and corresponding proportions estimated for the whole age group which attains certain international percentile norms on the test in Science

	Holding Power or Retentivity	International Percentiles and Scores					
		25th	50th	75th	85th	90th	95th
	13.1	20.6	29.5	34.8	38.7	43.3	
Australia	29	87	64	38	24	16	8
Belgium (Fl)	47	70	39	10	2	1	1
Belgium (Fr)	47	60	28	6	1	0	0
England	20	82	57	31	21	16	9
FRG	9	95	78	45	26	16	6
Finland	21	74	45	20	11	7	3
France	29	72	41	14	5	2	1
Hungary	28	87	62	27	14	8	4
Italy	16	59	29	9	4	3	1
Netherlands	13	79	56	34	23	16	7
New Zealand	13	91	77	56	42	33	21
Scotland	17	76	56	35	23	17	9
Sweden	45	71	42	20	11	7	3
United States	75	48	24	8	4	2	1
Range	66	47	54	48	41	33	21
Whole age group							
Australia	29	25	19	11	7	5	2
Belgium (Fl)	47	33	18	5	1	1	0
Belgium (Fr)	47	28	13	3	1	0	0
England	20	16	11	6	4	3	2
FRG	9	9	7	4	2	1	1
Finland	21	15	9	4	2	1	1
France	29	21	12	4	1	1	0
Hungary	28	24	17	7	4	2	1
Italy	16	9	5	1	1	0	0
Netherlands	13	10	7	4	3	2	1
New Zealand	13	12	10	7	5	4	3
Scotland	17	13	9	6	4	3	2
Sweden	45	32	19	9	5	3	2
United States	75	36	18	6	3	2	1
Range	66	27	14	10	6	5	3

Source: L.C. Comber & J.P. Keeves: Science Education in Nineteen Countries. Stockholm & New York: Almqvist & Wiksell/Halstead Press (Wiley), 1973.

on the science test, including six assigned items which have been headed "advanced general science". International percentiles (for the industrial countries) were calculated for the 95, 90, 85, 75 and 25-per cent levels. This means that our first task is to find out how many students in each country exceed the international standard for the best 5 per cent, 10 per cent etc. It will be seen from Table 3 that the average value of 43.3 points for the 95th percentile is exceeded by 3 per cent of pre-university students in Sweden or by 2 per cent of the whole age cohort.

As was observed in the international report on science,[25] the comparisons made here must take into account the fact that the different countries vary somewhat in their definitions of the target population for the particular level under study. As mentioned there, the definition called for the random sampling of those students who were ready to enter universities and other institutions of higher learning upon completion of secondary school. Since the qualification rules in force for Sweden were extended at the time this investigation was completed to include ad hoc entry for continuation school students, it was decided to make provision for these in spite of their limited qualification. In West

Germany, on the other hand, the focus of investigation did not go beyond those pupils who after grade 13 found themselves in the senior gymnasium class (Oberprima).

In Table 3 we have compared the countries with respect to those proportions of the random sample which attain certain international standards expressed in percentiles. If we start from the top with the 95th percentile, i.e. with the 5 per cent which lies at the top within the random sample itself, we find that New Zealand is distinctly superior to the other participating countries. This superiority also holds for other percentiles, the best 10 per cent and so on, a finding that could be expected in view of the high mean performance of the pre-university students of that country. England, Scotland and Australia have also high proportions of students above the international 5-per cent standard.

However, the question of deciding what a school system "produces" with its students is pertinent not only to how far it carries those who remain at the level under study, but also to what happens to those who have not gotten that far, i.e. have disappeared from the system. One would very much like to know about the formal educational experience (or in the majority of cases, the lack of such experience) of those who have not stuck it out to the end of pre-university

school. In other words: What about the standard of the whole age group? Since we obviously were in no position to administer achievement tests to those who no longer attend school, we have been compelled to make an assumption about the level below which the vast majority of those who have left the system may be thought to lie. (See the lower portion of Table 3). In countries where the majority finish school at the age of 14-15, and thus by the time they are 18-19 have been out of school for several years, it does not appear unreasonable to expect those who have left school to fall below the 25th percentile for those who graduate from upper secondary school. This standard roughly equates with the value attained by the average of high school seniors in the United States. In other countries, such as Sweden, where a great many have left at the age of 16, it may be dubious whether the assumption holds for virtually everybody. However, we have applied it throughout the whole series of countries.

I shall single out Sweden here, because the change-over to a comprehensive system with a spectacular broadening of the enrollment to the upper secondary school has been seen as an act of "lowering the standards".

If we figure out how large a part of the whole age cohort lies above the 95th percentile, we find that Sweden with its 2 per cent joins the company of the four Commonwealth countries at the top. All things considered, those countries which

have a broad recruitment base and/or have recently broadened it also show a high standard among the best. But Sweden also stands rather high when it comes to the 25th and 50th percentiles. This means that the "below-average" students in a system having a broad recruitment base may very well achieve respectable results by international standards.

Summing up, the following can be stated. According to the criteria of élitism here devised, i.e. the standard specified as a mean for equally large proportions of the age cohort, students in the Swedish upper secondary school clearly lie above the international average in Science. As to the second criterion, namely what the school system "produces" with the vast majority of its students, the following points may be noted. The Swedish mean works out a bit below the international average. Here it should be borne in mind that the Swedish random sample embraces both the continuation school and the gymnasium (the regular pre-university school), whereas the other European countries with more narrowly defined qualification rules have limited themselves to gymnasium students. When the proportion of the age cohort in school is appropriately allowed for, we find that the Swedish average, like the American one, is strongly influenced by the breadth of recruitment to the indicated level. Analysis of the effect of this broader recruitment base discloses that the Swedish school system ends up on the plus side of the standards ledger. International percentiles have been calculated, making it possible to determine how many within the sampled population, as well as within the whole age cohort, belong to the best 5,

10, 15, 25, 50 and 75 per cent by world standards. We then find that countries with broad recruitment tend, where the whole age cohort is concerned, to be superior to those with relatively selective systems.

The most reasonable explanation for these findings is that the comprehensive or "retentive" system provides a broader range of opportunities and a better utilization and development of talent. Systems with an early selection to academic secondary education show a stronger bias in favor of upper and middle class students at the pre-university level than do systems which are more comprehensive or retentive, as well as more flexible in the sense that the final choice between a pre-university and a vocational program is made at the age of 15-17 instead of at the age of 10-12.

As was emphasized earlier, the "productivity" of a school system ought to be assessed not only by the quality of its final products: the students who qualify for university entrance, because we are then comparing widely varying proportions of age groups, and we leave out those who are either excluded from secondary education or do not survive it. We are therefore entitled to put the question like this: "How many are brought how far?"

We have shown that an élite comparable in quality to that of an "élite system" can be cultivated within a retentive and comprehensive system. In the selective system, however, the high standard of the élite is often bought at the price of low accomplishments by the mass. Selection for the pre-uni-

versity school takes place at an early age, and the majority of students are left to complete either an elementary school or a low-prestige program within the secondary school with virtually no chance to transfer to a university-preparing program. In order to be able to assess the total yield we ought to measure the performances of pupils at the intermediate terminal point, when compulsory schooling has been completed. Postlethwaite has used IEA data to show that higher retentivity is associated with higher "yield"; that is, the majority of students in a retentive system tend to achieve better than the corresponding groups in a selective system.[26]

Concluding remarks

When the 1946 Swedish School Commission submitted its main report to the Government in 1948 and suggested a nine-year comprehensive school to replace all other school types covering the period of compulsory schooling, its recommendations were allegedly based upon commissioned studies on the intellectual development of ability structures in school children.[27] Everybody who took part in the debate, pro or con, was at that time convinced that scholastic aptitude was mainly inherited and that the ability to profit from academic programs could be assessed at the age of 11 or 12. But the Commission rejected selection for the academic, grammar school type of program at that early age chiefly because this would deprive the other programs and the ensuing vocational tracks of their "proper share" of talent. Furthermore, the aptitudes for many of

the more "practical" occupations seemed to "mature" later than those for theoretical pursuits. Unfortunately, both those who were in favor of late differentiation and those against it confused diagnosis with prognosis. It is one thing to measure the actual ability (for instance the verbal proficiency) of the child, which certainly can be done rather accurately; it is quite another to use the score as a predictive index. Good measures of home environment (including "process variables" covering child-parent interaction) predict success in the secondary academic school better than IQ and similar indices do.[28] But so far nobody has suggested (or dared to suggest) that social background should be used when selecting children for the grammar type of school!

The main pedagogical issue, as can for instance be seen from the two "Black Papers" [28] prepared by a group of anti-comprehensive persons in England, is to what extent the comprehensive system is "lowering standards". To come to grips with this problem one of course has to define what is meant by "standard". There is much to be said for defining it by the formula "how many are brought how far?". A comparative evaluation of comprehensive and selective systems would be incomplete if limited to the end-products of the systems, mainly because the price paid for the quality of the end-products is not taken into consideration. There is, for instance, no point in comparing the average performance of high school graduates in the United States or Japan with those who sit for the baccalauréat in France, because the

former consist of the majority of the corresponding age cohort, whereas the latter are a clear minority.

The issue whether a school system (local or national) should "go comprehensive", i.e. become integrated or not in terms of social recruitment and programs, cannot, as I have tried to show in the presentation above, be settled on the basis of purely pedagogical considerations only. Nor can it be settled by drawing mainly upon evidence from psychological research. The educational system does not, and should not, operate in a social vacuum; it is today more than ever an integral part of the socio-economic fabric. Therefore, an educational system cannot be shaped chiefly on the basis of pedagogical considerations.

NOTES

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